FOURTH GRADE
Number and Number Sense

Brownies

Format: Whole class

SOL Objectives:
4.2 The student will
a) identify, model, and compare rational numbers (fractions and mixed numbers), using concrete objects and pictures

Related SOL: 1.6, 2.4, 3.5, 3.6

Vocabulary: *fraction*, *mixed number*, *half*, *halves*, *fourths*, *eighths*, *whole*

Materials: A large sheet of paper with the title, "Brownies" (one per student); seven "brownies" (e.g., pieces of brown construction paper) per student

Time Required: 25 to 30 minutes

Directions:
1. Tell students that they are going to solve a "brownie" problem.
2. Give each student the large sheet of paper with the title, "Brownies," and ask them to draw a table (e.g., a rectangle) that seats four people.
3. Tell students that the four people around the table will need to share seven brownies.
4. Show students that the "brownies" are the seven pieces of brown construction paper, which are to be used to demonstrate how to share the brownies fairly.
5. Students may fold or draw on the construction-paper brownies to solve the brownie-sharing problem. Remind students that using a pencil to show their work is a good strategy. Students also should include their steps for sharing the brownies. Ask questions like:
    - How did you "cut" your brownies?
    - What is a fraction?
    - How do you know that each person got a "fair share"?
6. Have students discuss their discoveries with each other and with the class.
7. Have students compare strategies and restate a classmate's strategy in their own words.

The Rocky Digits

Format: Small groups, partners

SOL Objectives:

4.1 The student will

a) identify (orally and in writing) the place value for each digit in a whole number expressed through millions;

b) compare two whole numbers expressed through millions, using symbols (>, <, or =)

Related SOL: 1.1, 1.2, 1.4, 2.1, 2.2

Vocabulary: *ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, place value, rounding, digit, whole number, period, units*

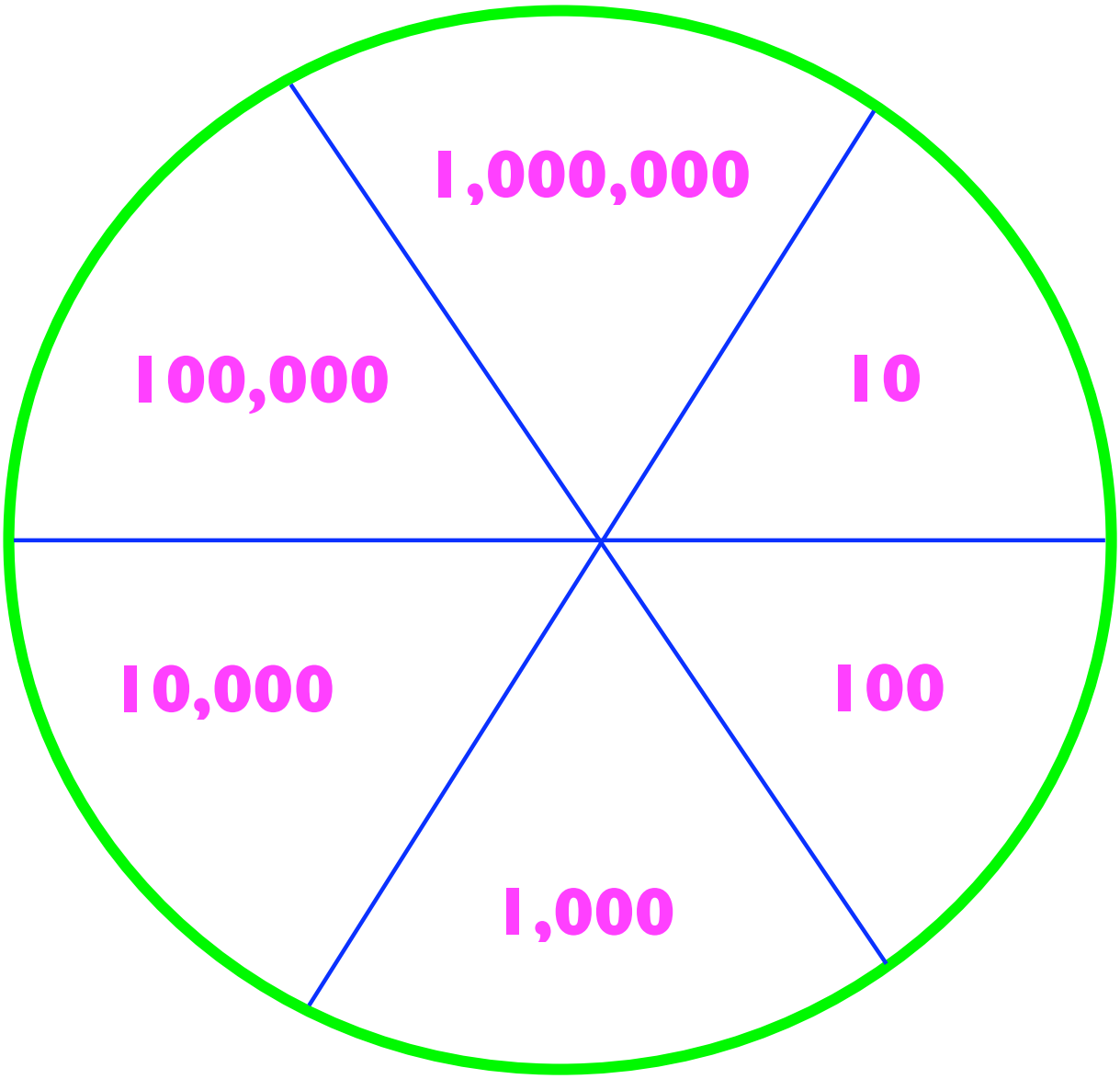
Materials: Digit cards (one set per group); game markers for each player (e.g., small stones); "The Rocky Digits" game board for each group; spinner board and spinner (e.g., pencil or paper clip) for each group

Time Required: 15 to 25 minutes

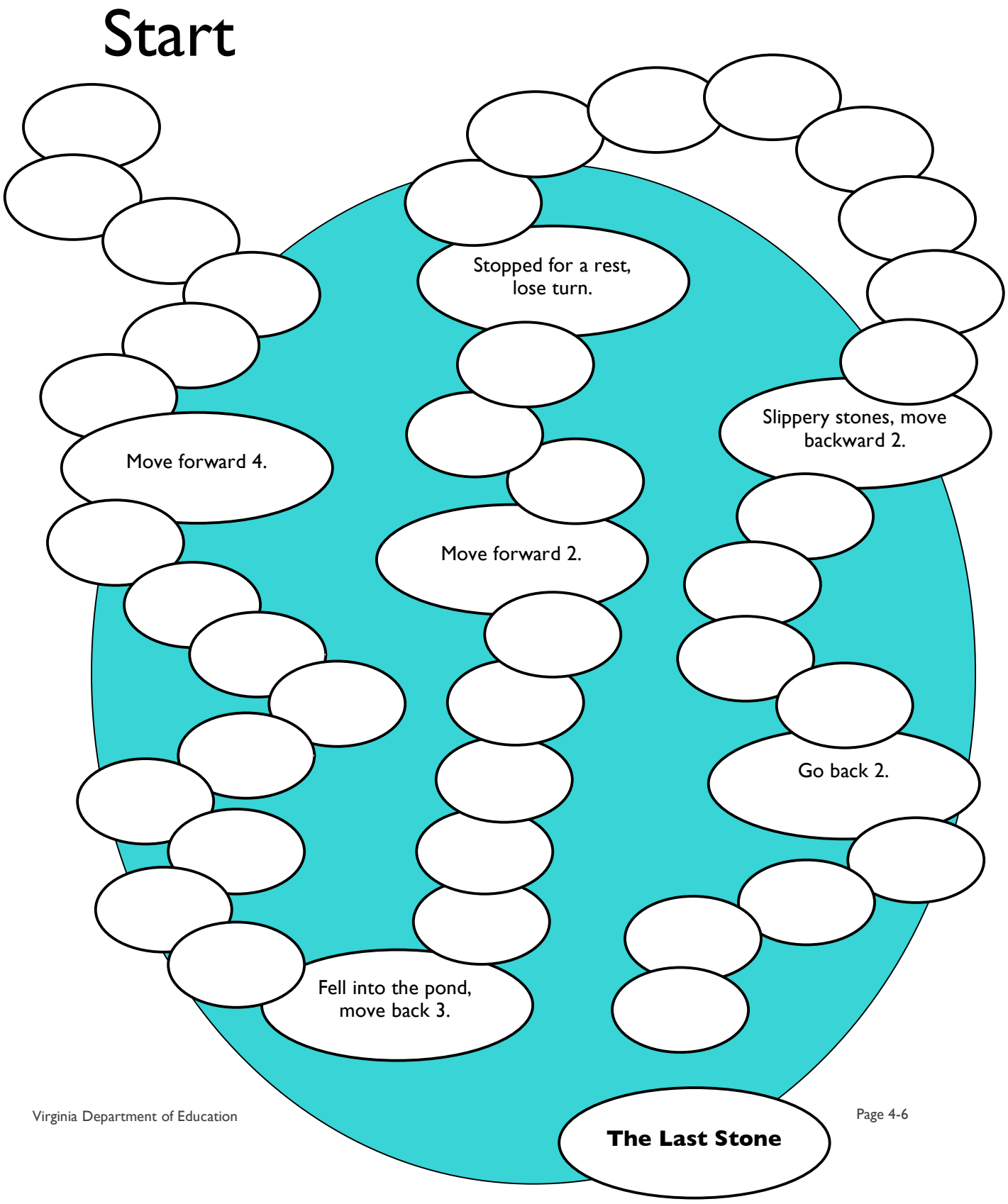
Directions:

1. Introduce this activity by reviewing place values.
2. Have students cut out the attached digit cards, and place the cards facedown in a pile.
3. Instruct all players to place their markers on "Start."
4. Players should take turns picking the top card from the pile and then spinning the spinner.
5. When the spinner stops, the player should name the number on the card that corresponds with the place value where the spinner landed. After other students have agreed with the player's answer, the player will move his or her marker that many spaces (i.e., the number in the named digit place) ahead on the game board. If the number on the card does not contain the place value on the spinner, the player loses a turn.
6. Players who land on spaces with directions must follow those directions.
7. The winner is the first person to reach the finish.

Spinner



The Rocky Digits



Digit Cards

1,673,126	1,408,234
2,327,245	1,308,601
731,518	292,567
1,202,469	1,021,321
3,105,304	473,518
708,246	123,152

2,101,921	1,247,317
815,384	583,561
2,008,773	964,232
524,789	3,106,528
815,437	756,243
4,569,262	100,744

1,239,761	8,280,310
6,544,473	2,080,554
2,183,270	7,883,090
3,350,302	402,004
530,182	1,208,241
2,183,270	7,883,090

To Be Half, or Not to Be Half…That Is the Comparison

Format: Partners

SOL Objectives:

4.2 The student will
a) identify, model, and compare rational numbers (fractions and mixed numbers), using concrete objects and pictures;
b) represent equivalent fractions

4.3 The student will compare numerical value of fractions (with like and unlike denominators) having denominators of 12 or less, using concrete materials.

Related SOL: 1.6, 2.4, 3.6, 4.2

Vocabulary: *fraction*, *numerator*, *denominator*, *half*, *thirds*, *fourths*, *fifths*, *sixths*, *sevenths*, *eighths, tenths*, *greater than*, *less than*, *equal to*

Materials: One set of fraction cards per student; color tiles or fraction circles; fraction sorting mat; scissors

Time Required: 30 to 40 minutes

Directions:

This activity helps students become familiar with fractions, using concrete models to determine if a fractional part of a whole is less than $\frac{1}{2}$, equal to $\frac{1}{2}$, or greater than $\frac{1}{2}$.

1. Direct students to cut the fraction cards apart and shuffle them.
2. Use the fraction sorting mat labeled with three sections: "Less than $\frac{1}{2}$", "Equal to $\frac{1}{2}$", and "Greater than $\frac{1}{2}$".
3. Have students place the fraction cards facedown in a stack.
4. Ask students to place the color tiles, fraction circles, or other concrete fraction manipulative near the two players.
5. Ask students to take one whole and one $\frac{1}{2}$ manipulative and place above the game board to use as a benchmark.
6. Player One will take a fraction card from the top of the deck and determine if the fraction is "less than $\frac{1}{2}$", "equal to $\frac{1}{2}$", or "greater than $\frac{1}{2}$," and then place the fraction card in the appropriate section of the sorting mat. To prove that the card is in the correct place, Player One will need to use the manipulatives to build a model of the fraction and compare it to a model of $\frac{1}{2}$. If the other player agrees, Player One will earn one point. If Player One has placed the fraction card in the wrong section of the mat, he or she will not earn a point.
7. Player Two will now have a turn, following the same steps as Player One.
8. The players can keep score by tallying their points on the fraction sorting mat. Players earn one point for each correct placement. The player with the most points wins the game.

Fraction Cards

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{2}{4}$
$\frac{3}{4}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$
$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$
$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{5}{8}$
$\frac{6}{8}$	$\frac{7}{8}$	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$

$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$
$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$
$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$
$\frac{1}{7}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{5}{7}$

Fraction Sorting Mat

Less than ½	Equal to ½	Greater than ½

In Step with Numbers

Format: Partners

SOL Objectives:

4.1 The student will
a) identify (orally and in writing) the place value for each digit in a whole number expressed through millions;
b) compare two whole numbers expressed through the millions, using symbols (>, <, or =)

Related SOL: 1.1, 1.2, 1.4, 2.1, 2.2

Vocabulary: *ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, place value, rounding, digit, whole number, period, units*

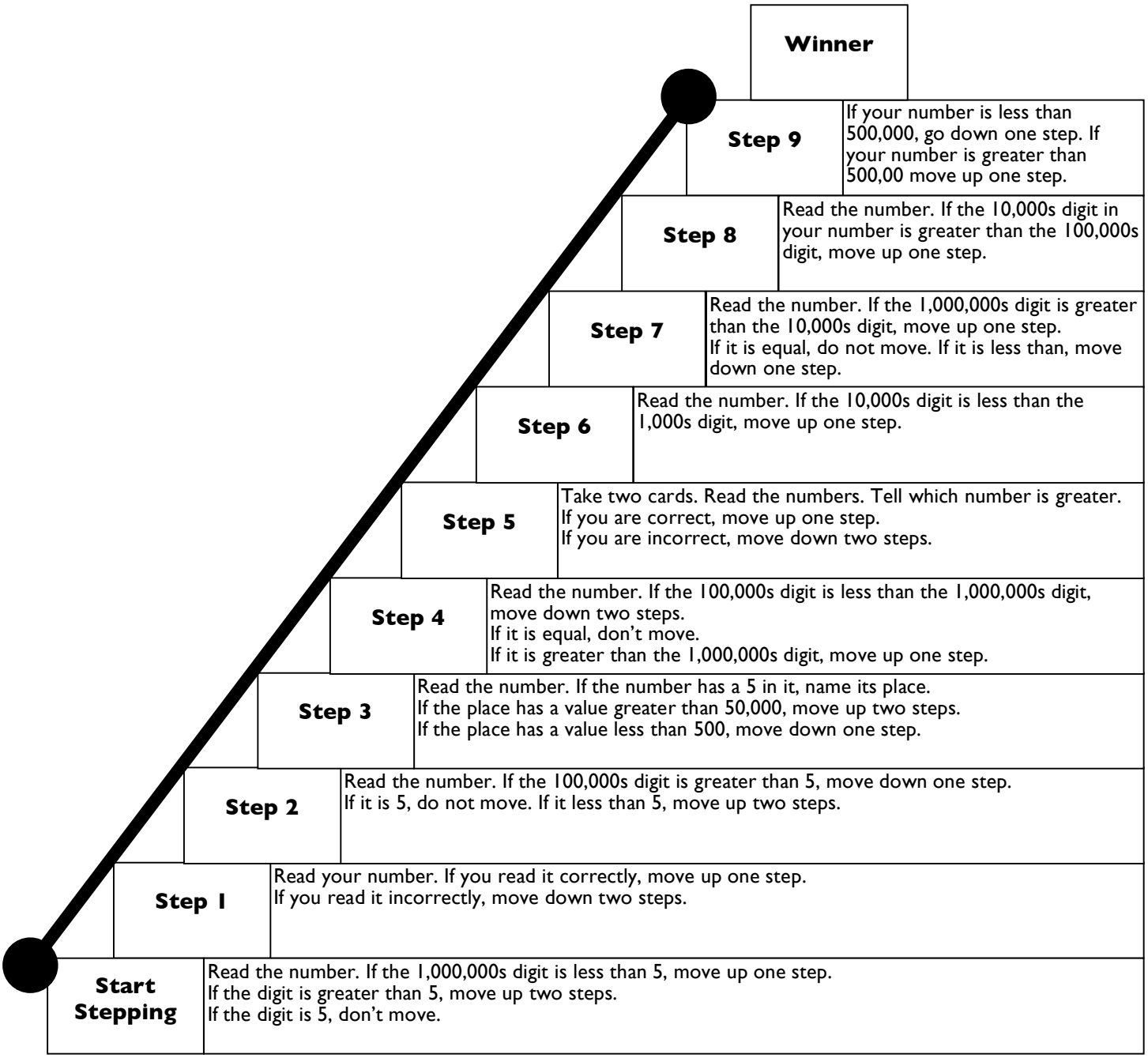
Materials: Number cards (one set per pair of students); game marker for each player; game board for "In Step with Numbers" (one per pair)

Time Required: 15 to 25 minutes

Directions:

1. Introduce the activity by reviewing place values.
2. Put the number cards facedown in a pile and have the players place their markers on "Start."
3. Player One picks a card from the top of the pile. The player then reads the directions beside the "step" that he or she is on. Player One *cannot* move to the next step if the directions are not followed, as agreed to by Player Two.
4. Player One concludes turn by placing the number card at the bottom of the pile.
5. Player Two follows the same steps as Player One.
6. The game continues until one of the players has successfully reached the top.

In Step With Numbers



Number Cards

1,791,926	2,648,134
2,987,245	3,125,691
6,134,548	1,892,657
3,187,469	4,377,821
2,581,385	3,483,518
6,118,749	8,129,152

1,239,760	4,828,030
4,569,262	5,144,794
6,544,473	2,080,554
4,983,279	7,083,090
7,350,302	2,908,534
6,578,102	3,418,241

Paper Bag Fractions

Format: Partners

SOL Objectives:
4.2 The student will
a) identify, model, and compare rational numbers (fractions and mixed numbers), using concrete objects and pictures;
b) represent equivalent fractions

Related SOL: 1.6, 2.4, 3.6, 4.2

Vocabulary: *fraction*, *numerator*, *denominator*, *half*, *thirds*, *fourths*, *fifths*, *sixths*, *eighths*, *tenths*, *twelfths*, *greater than*, *less than*, *equal to*

Materials:
- One "Paper Bag Fraction" game board per pair (teachers can also create their boards); 20 to 25 counters to use as markers; one paper bag per pair; one set of fraction bars (student made or purchased). *Note:* The fraction bars are *not* the plastic pieces but rather the strips that are shaded to show an indicated fraction. It may be helpful to have students make their own fraction strips prior to playing the game. This task can be done by cutting 28 strips that are 1 x 6 for every student (using 9 x 12 or 12 x 18 paper makes it easier). Have students measure and shade their fraction bars as follows (students may color the bars as they choose):
  - One unit bar, no divisions
  - Two bars divided into two parts (3"). Shade one whole entirely, then $\frac{1}{2}$.
  - Three bars divided into thirds (2"). Shade one whole entirely, then $\frac{1}{3}$, then $\frac{2}{3}$.
  - Four bars divided into fourths (1.5"). Shade one whole entirely, then $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}$.
  - Six bars divided into sixths (1"). Shade one whole entirely, then $\frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{4}{6}, \frac{5}{6}$.
  - Twelve bars divided into twelfths (0.5"). Shade one whole entirely, then $\frac{1}{12}, \frac{2}{12}, \frac{3}{12}, \frac{4}{12}, \frac{5}{12}, \frac{6}{12}, \frac{7}{12}, \frac{8}{12}, \frac{9}{12}, \frac{10}{12}, \frac{11}{12}$.

Time Required: 25 to 30 minutes

Directions:
1. Give partners a "Paper Bag Fraction" game board and one paper bag filled with the set of fraction bars. Place a container of counters and markers in the center of the table for students to share.
2. The object of the game is to cover five fractions in a row—horizontally, vertically, or diagonally. Each player will take a turn choosing a fraction bar from the paper bag, naming the fraction, and marking one fraction on the game board. After each turn, the player should return the fraction bar to the bag. The next player will choose a fraction bar from the bag and mark one answer on the game board, returning the fraction bar to the paper bag.
3. A strategy for the opponent is to block the other player from placing five counters in a row.
4. The first player to cover five fractions in a row wins.

Variations:
- Allow students to cover an equivalent fraction for the fraction bar that has been taken from the paper bag.

Paper Bag Fraction Game Board

$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{12}$	$\frac{3}{6}$
$\frac{1}{2}$	$\frac{5}{12}$	$\frac{1}{3}$	$\frac{2}{4}$	$\frac{2}{6}$
$\frac{4}{4}$	$\frac{2}{6}$	$\frac{4}{6}$	$\frac{3}{3}$	$\frac{3}{12}$
$\frac{10}{12}$	$\frac{2}{2}$	$\frac{8}{12}$	$\frac{5}{6}$	$\frac{4}{12}$
$\frac{7}{12}$	$\frac{4}{8}$	$\frac{9}{12}$	$\frac{1}{6}$	$\frac{11}{12}$

Rounding Match

Format: Individual, partners

SOL Objectives:

4.1 The student will
a) identify (orally and in writing) the place value for each digit in a whole number expressed through millions;
b) compare two whole numbers expressed through millions, using symbols (>, <, or =); and
c) round whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand.

Related SOL: 1.1, 1.2, 1.4, 2.1, 2.2

Vocabulary: *ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, place value, rounding, digit, whole number, period, units*

Materials: A deck of "Rounding Match" cards per student or pair (copy the cards on cardstock and store in a baggie)

Time Required: 10 to 15 minutes

Directions:

1. Make sets of the "Rounding Match" card deck.
2. Have students, individually or in pairs, separate the cards into two piles. One pile will be cards that contain numbers with an underlined digit; the second pile will be numbers that end in zeros.
3. Have students place these two piles faceup on their desks, making sure not to mix the two piles.
4. Students will take turns collecting rounding matches. Player One chooses a card from the "underlined" pile. The student must name the place with the underlined digit. The underlined digit indicates the place that the number will be rounded to.
5. Player One looks through the other pile to find the "rounding match" for the number chosen from pile one. If Player Two agrees with the "rounding match," then Player One gets to keep the match. Players take turns until all cards have matches.
6. The player with the most "rounding matches" is the winner.

Rounding Match Cards

536,780	540,000
5,638,321	5,600,000
8,042	8,000
54,906	50,000
15,387	20,000
13,097	10,000
54,682	55,000
9,302	9,000
483,102	500,000
2,473,361	2,500,000

740,678	700,000
4,971	5,000
1,743	1,700
8,416	8,420
5,132,630	5,130,00
804,234	800,000
8,416	8,400
3,761	3,800
2,560,954	2,600,000
1,754,231	1,800,000

2,862,641	2,860,000
756,910	760,000
2,387,105	2,390,000
2,822,716	2,820,000
367,098	367,000
2,345,011	2,350,000
133,947	130,000
6,012,509	6,013,000
5,097,432	5,100,000